APPENDIX N
Laboratory and In-Situ Hydraulic Conductivity Testing Results
HYDRAULIC CONDUCTIVITY TEST
ASTM D 5084 (CONSTANT HEAD)

SAMPLE IDENTIFICATION

<table>
<thead>
<tr>
<th>PROJECT NUMBER</th>
<th>SAMPLE DEPTH, m</th>
<th>12-1125-0045</th>
<th>2.13-2.68</th>
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<td>BOREHOLE NUMBER</td>
<td></td>
<td>12-03-03</td>
<td>03/12/2013</td>
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</table>

SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

| SAMPLE HEIGHT, cm | 7.66 | UNIT WEIGHT, kN/m$^3$ | 15.44 |
| SAMPLE DIAMETER, cm | 6.90 | DRY UNIT WEIGHT, kN/m$^3$ | 8.71 |
| SAMPLE AREA, cm$^2$ | 37.40 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 286.59 | VOLUME OF SOLIDS, cm$^3$ | 94.24 |
| TOTAL MASS, g | 451.30 | VOLUME OF voidS, cm$^3$ | 192.34 |
| DRY MASS, g | 254.46 | VOID RATIO | 2.04 |
| WATER CONTENT, % | 77.4 |  |  |

SATURATION STAGE

| CELL PRESSURE, kPa | 210 | EFFECTIVE CONFining STRESS, kPa | 5 |
| HEAD PRESSURE, kPa | 205 | DURATION, min | 2790 |
| BACK PRESSURE, kPa | 205 | $\beta$ COEFFICIENT | 0.89 |

CONSOLIDATION STAGE

| CELL PRESSURE, kPa | 226 | EFFECTIVE CONFining STRESS, kPa | 21 |
| HEAD PRESSURE, kPa | 205 | DURATION, min | 1425 |
| BACK PRESSURE, kPa | 205 | VOLUME CHANGE, cm$^3$ | 2.7 |
| DRAINAGE Top and Bottom |  |  |  |

SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

| SAMPLE HEIGHT, cm | 7.64 | SAMPLE AREA, cm$^2$ | 37.17 |
| SAMPLE DIAMETER, cm | 6.88 | SAMPLE VOLUME, cm$^3$ | 283.89 |

HYDRAULIC CONDUCTIVITY STAGE

| CELL PRESSURE, kPa | 241 | EFFECTIVE CONFining STRESS, kPa | 21 |
| HEAD PRESSURE, kPa | 220 | DURATION, min | 4409.0 |
| BACK PRESSURE, kPa | 205 | HYDRAULIC GRADIENT, $i$ | 20 |

SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

| SAMPLE HEIGHT, cm | 7.64 | UNIT WEIGHT, kN/m$^3$ | 15.40 |
| SAMPLE DIAMETER, cm | 6.88 | DRY UNIT WEIGHT, kN/m$^3$ | 8.79 |
| SAMPLE AREA, cm$^2$ | 37.17 | SPECIFIC GRAVITY, assumed | 2.70 |
| SAMPLE VOLUME, cm$^3$ | 283.89 | VOLUME OF SOLIDS, cm$^3$ | 94.24 |
| TOTAL MASS, g | 445.80 | VOLUME OF voidS, cm$^3$ | 189.65 |
| DRY MASS, g | 254.46 | VOID RATIO | 2.01 |
| WATER CONTENT, % | 75.2 |  |  |

TEST RESULTS

- ELAPSED TIME TO STEADY STATE FLOW (min) 0.0
- DURATION OF STEADY STATE FLOW (min) 4409.0
- INFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) 33.6
- OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm$^3$) 37.6
- HYDRAULIC CONDUCTIVITY (INFLOW) (cm/s) 1.71E-07
- HYDRAULIC CONDUCTIVITY (OUTFLOW) (cm/s) 1.91E-07
- HYDRAULIC CONDUCTIVITY, K, cm/s 1.81E-07

NOTES:

- PERMEANT FLUID Desired tap water

Prepared By: RD
Golder Associates
Checked By: J.M.
# HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5984 (CONSTANT HEAD)**

## SAMPLE IDENTIFICATION

<table>
<thead>
<tr>
<th>PROJECT NUMBER</th>
<th>SAMPLE</th>
<th>PROJECT TITLE</th>
<th>SAMPLE DEPTH, m</th>
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<tr>
<td>12-1125-0045</td>
<td>3</td>
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<td>11.43-12.00</td>
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<th>DATE</th>
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<tbody>
<tr>
<td>12-02-03</td>
<td>03/01/2013</td>
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## SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

<table>
<thead>
<tr>
<th>SAMPLE HEIGHT, cm 7.48</th>
<th>UNIT WEIGHT, kN/m² 16.07</th>
</tr>
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<tbody>
<tr>
<td>SAMPLE DIAMETER, cm 6.92</td>
<td>DRY UNIT WEIGHT, kN/m³ 9.94</td>
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<tr>
<td>SAMPLE AREA, cm² 37.61</td>
<td>SPECIFIC GRAVITY, assumed 2.70</td>
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<tr>
<td>SAMPLE VOLUME, cm³ 281.32</td>
<td>VOLUME OF SOLIDS, cm³ 105.57</td>
</tr>
<tr>
<td>TOTAL MASS, g 460.90</td>
<td>VOLUME OF VOIDS, cm³ 175.75</td>
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<tr>
<td>DRY MASS, g 285.03</td>
<td>VOID RATIO 1.66</td>
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</tbody>
</table>

| WATER CONTENT, % 61.7 |

## SATURATION STAGE

| CELL PRESSURE, kPa 350 | EFFECTIVE CONFINING STRESS, kPa 5 |
| HEAD PRESSURE, kPa 345 | DURATION, min 4,140 |
| BACK PRESSURE, kPa 345 | B COEFFICIENT 0.96 |

## CONSOLIDATION STAGE

| CELL PRESSURE, kPa 416 | EFFECTIVE CONFINING STRESS, kPa 71 |
| HEAD PRESSURE, kPa 345 | DURATION, min 1,485 |
| BACK PRESSURE, kPa 346 | VOLUME CHANGE, cm³ 5.5 |

| DRAINAGE Top and Bottom |

## SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

<table>
<thead>
<tr>
<th>SAMPLE HEIGHT, cm 7.43</th>
<th>SAMPLE AREA, cm² 37.12</th>
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<tbody>
<tr>
<td>SAMPLE DIAMETER, cm 6.87</td>
<td>SAMPLE VOLUME, cm³ 275.85</td>
</tr>
</tbody>
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## HYDRAULIC CONDUCTIVITY STAGE

| CELL PRESSURE, kPa 431 | EFFECTIVE CONFINING STRESS, kPa 71 |
| HEAD PRESSURE, kPa 360 | DURATION, min 4223.0 |
| BACK PRESSURE, kPa 345 | HYDRAULIC GRADIENT, i 21 |

## SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

<table>
<thead>
<tr>
<th>SAMPLE HEIGHT, cm 7.43</th>
<th>UNIT WEIGHT, kN/m² 16.27</th>
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<tr>
<td>SAMPLE DIAMETER, cm 6.87</td>
<td>DRY UNIT WEIGHT, kN/m³ 10.13</td>
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<tr>
<td>SAMPLE AREA, cm² 37.12</td>
<td>SPECIFIC GRAVITY, assumed 2.70</td>
</tr>
<tr>
<td>SAMPLE VOLUME, cm³ 275.85</td>
<td>VOLUME OF SOLIDS, cm³ 105.57</td>
</tr>
<tr>
<td>TOTAL MASS, g 457.60</td>
<td>VOLUME OF VOIDS, cm³ 170.28</td>
</tr>
<tr>
<td>DRY MASS, g 285.03</td>
<td>VOID RATIO 1.61</td>
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</table>

| WATER CONTENT, % 60.5 |

## TEST RESULTS

| ELAPSED TIME TO STEADY STATE FLOW (min) 0.0 |
| DURATION OF STEADY STATE FLOW (min) 4223.0 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm³) 17.3 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm³) 16.0 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (cm/s) 8.91E-08 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (cm/s) 9.30E-08 |
| HYDRAULIC CONDUCTIVITY, K, cm/s 9.16E-08 |

## NOTES:

PERMEANT FLUID Desired tap water
# HYDRAULIC CONDUCTIVITY TEST

**ASTM D 5684 (CONSTANT HEAD)**

## SAMPLE IDENTIFICATION

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<td>SAMPLE IDENTIFICATION</td>
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## SPECIMEN PROPERTIES AND DIMENSIONS (INITIAL)

| SAMPLE HEIGHT, cm | 6.98 |
| SAMPLE DIAMETER, cm | 6.94 |
| SAMPLE AREA, cm² | 37.84 |
| SAMPLE VOLUME, cm³ | 264.26 |
| TOTAL MASS, g | 418.60 |
| DRY MASS, g | 246.16 |
| WATER CONTENT, % | 70.1 |
| UNIT WEIGHT, kN/m³ | 15.53 |
| DRY UNIT WEIGHT, kN/m³ | 9.13 |
| SPECIFIC GRAVITY, assumed | 2.70 |
| VOLUME OF SOLIDS, cm³ | 91.17 |
| VOLUME OF VOIDS, cm³ | 173.09 |
| VOID RATIO | 1.90 |

## SATURATION STAGE

| CELL PRESSURE, kPa | 210 | EFFECTIVE CONFINING STRESS, kPa | 5 |
| HEAD PRESSURE, kPa | 205 | DURATION, min | 2.520 |
| BACK PRESSURE, kPa | 205 | B COEFFICIENT | 0.99 |

## CONSOLIDATION STAGE

| CELL PRESSURE, kPa | 322 | EFFECTIVE CONFINING STRESS, kPa | 117 |
| HEAD PRESSURE, kPa | 205 | DURATION, min | 2.250 |
| BACK PRESSURE, kPa | 205 | VOLUME CHANGE, cm³ | 11.5 |

## Top and Bottom Drainage

## SPECIMEN PROPERTIES AND DIMENSIONS (AFTER CONSOLIDATION)

| SAMPLE HEIGHT, cm | 6.88 |
| SAMPLE DIAMETER, cm | 6.84 |
| SAMPLE AREA, cm² | 36.74 |
| SAMPLE VOLUME, cm³ | 252.87 |

## HYDRAULIC CONDUCTIVITY STAGE

| CELL PRESSURE, kPa | 336 | EFFECTIVE CONFINING STRESS, kPa | 117 |
| HEAD PRESSURE, kPa | 219 | DURATION, min | 3333.0 |
| BACK PRESSURE, kPa | 205 | HYDRAULIC GRADIENT, i | 21 |

## SPECIMEN PROPERTIES AND DIMENSIONS (FINAL)

| SAMPLE HEIGHT, cm | 6.88 |
| SAMPLE DIAMETER, cm | 6.84 |
| SAMPLE AREA, cm² | 36.74 |
| SAMPLE VOLUME, cm³ | 252.87 |
| TOTAL MASS, g | 414.66 |
| DRY MASS, g | 246.16 |
| WATER CONTENT, % | 68.5 |
| UNIT WEIGHT, kN/m³ | 16.08 |
| DRY UNIT WEIGHT, kN/m³ | 9.55 |
| SPECIFIC GRAVITY, assumed | 2.70 |
| VOLUME OF SOLIDS, cm³ | 91.17 |
| VOLUME OF VOIDS, cm³ | 161.70 |
| VOID RATIO | 1.77 |

## TEST RESULTS

| ELAPSED TIME TO STEADY STATE FLOW (min) | 0.0 |
| DURATION OF STEADY STATE FLOW (min) | 3333.0 |
| INFLOW VOLUME UNDER STEADY STATE FLOW (cm³) | 10.9 |
| OUTFLOW VOLUME UNDER STEADY STATE FLOW (cm³) | 11.3 |
| HYDRAULIC CONDUCTIVITY (INFLOW) (cm/s) | 7.15E-08 |
| HYDRAULIC CONDUCTIVITY (OUTFLOW) (cm/s) | 7.42E-08 |
| HYDRAULIC CONDUCTIVITY, K, cm/s | 7.28E-08 |

## NOTES:

**PERMEANT FLUID**

Drained tap water

Prepared By: N.D

Golder Associates

Checked By:
HYDRAULIC CONDUCTIVITY TEST

FLOW VOLUME, cm³ vs. ELAPSED TIME, min.

BH 12-01-03 Sample 6

Golder Associates

Project No: 12-1125-0045
Prepared By: RD

Checked By:
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-1-3-1

INTERVAL (metres below ground surface)

Top of Interval = 40.1
Bottom of Interval = 45.4

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right) \frac{1}{t} \ln \frac{y_0}{y_t}}{2L_e}
\]

where \( K = \text{m/sec} \)

where:

- \( r_c = \) casing radius (metres);
- \( r_w = \) radial distance to undisturbed aquifer (metres);
- \( R_e = \) effective radius (metres);
- \( y_0 = \) initial drawdown (metres);
- \( L_e = \) length of screened interval (metres);
- \( y_t = \) drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
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<td>( r_c )</td>
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<tr>
<td>( r_w )</td>
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<tr>
<td>( L_e )</td>
<td>5.27</td>
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<tr>
<td>( \ln(R_e/r_w) )</td>
<td>3.10</td>
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<tr>
<td>( y_0 )</td>
<td>0.02</td>
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<td>( y_t )</td>
<td>0.01</td>
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<tr>
<td>( t )</td>
<td>600.0</td>
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RESULTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>( K = ) \text{m/sec}</td>
<td>( 2E-07 )</td>
</tr>
<tr>
<td>( K = ) \text{cm/sec}</td>
<td>( 2E-05 )</td>
</tr>
</tbody>
</table>

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis Date: 1/15/2013

Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 12-1-4A

INTERVAL (metres below ground surface)

Top of Interval = 36.0
Bottom of Interval = 39.5

\[
K = \frac{r_c^2 ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \frac{1}{y_0 - y_t}
\]

where \(K = \text{m/sec}\)

where:
- \(r_c\) = casing radius (metres);
- \(r_w\) = radial distance to undisturbed aquifer (metres);
- \(R_e\) = effective radius (metres);
- \(L_e\) = length of screened interval (metres);
- \(y_0\) = initial drawdown (metres);
- \(y_t\) = drawdown (metres) at time \(t\) (seconds)

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<th>INPUT PARAMETERS</th>
<th>RESULTS</th>
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<td>(r_c) = 0.02</td>
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</tr>
<tr>
<td>(r_w) = 0.06</td>
<td></td>
</tr>
<tr>
<td>(L_e) = 3.50</td>
<td></td>
</tr>
<tr>
<td>(ln(R_e/r_w)) = 2.92</td>
<td>(K = 3E-06) m/sec</td>
</tr>
<tr>
<td>(y_0) = 0.04</td>
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<tr>
<td>(y_t) = 0.00</td>
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<tr>
<td>(t) = 90.0</td>
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Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis Date: 1/15/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-1-5B

INTERVAL (metres below ground surface)

Top of Interval = 4.8
Bottom of Interval = 5.0

$$K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \left( \frac{1}{t} \ln \frac{y_0}{y_t} \right)$$

where $K$=m/sec

$r_c$ = casing radius (metres);
$r_w$ = radial distance to undisturbed aquifer (metres);
$R_e$ = effective radius (metres);
$L_e$ = length of screened interval (metres);
$y_0$ = initial drawdown (metres);
$y_t$ = drawdown (metres) at time $t$ (seconds)

INPUT PARAMETERS

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<th>Value</th>
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<td>$y_t$</td>
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<tr>
<td>$t$</td>
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RESULTS

<table>
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<tr>
<td>$K$</td>
<td>5E-07 m/sec</td>
</tr>
<tr>
<td>$K'$</td>
<td>5E-05 cm/sec</td>
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</tbody>
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Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis By: DH
Checked By: CHM
Analysis Date: 1/15/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-1-6

INTERVAL (metres below ground surface)
Top of Interval = 0.3
Bottom of Interval = 1.5

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

\( r_c \) = casing radius (metres);
\( r_w \) = radial distance to undisturbed aquifer (metres);
\( R_e \) = effective radius (metres);
\( y_0 \) = initial drawdown (metres);
\( L_e \) = length of screened interval (metres);
\( y_t \) = drawdown (metres) at time \( t \) (seconds)

<table>
<thead>
<tr>
<th>INPUT PARAMETERS</th>
<th>RESULTS</th>
</tr>
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<tbody>
<tr>
<td>( r_c ) = 0.03</td>
<td>( K = 9E-08 \text{ cm/sec} )</td>
</tr>
<tr>
<td>( r_w ) = 0.10</td>
<td></td>
</tr>
<tr>
<td>( L_e ) = 1.20</td>
<td></td>
</tr>
<tr>
<td>( \ln(R_e/r_w) ) = 1.84</td>
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</tr>
<tr>
<td>( y_0 ) = 0.15</td>
<td></td>
</tr>
<tr>
<td>( y_t ) = 0.13</td>
<td></td>
</tr>
<tr>
<td>( t ) = 1000.0</td>
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Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis By: DH
Checked By: CHM
Analysis Date: 1/15/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-2-3

INTERVAL (metres below ground surface)

Top of Interval = 37.0
Bottom of Interval = 42.0

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[
\begin{align*}
  r_c &= 0.03 \\
  r_w &= 0.05 \\
  L_e &= 4.95 \\
  \ln \left( \frac{R_e}{r_w} \right) &= 3.05 \\
  y_0 &= 0.80 \\
  y_t &= 0.01 \\
  t &= 100.0
\end{align*}
\]

RESULTS

\[
K = 2 \times 10^{-5} \text{ m/sec}
\]

\[
K = 2 \times 10^{-3} \text{ cm/sec}
\]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1125-0045
Checked By: CHM
Test Date: 01/22/13
Analysis Date: 1/22/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST BH12-2-5B

INTERVAL (metres below ground surface)

Top of Interval = 6.3
Bottom of Interval = 6.6

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

\( r_c = \) casing radius (metres);
\( r_w = \) radial distance to undisturbed aquifer (metres)
\( R_e = \) effective radius (metres);
\( y_0 = \) initial drawdown (metres)
\( L_e = \) length of screened interval (metres);
\( y_t = \) drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\( r_c = 0.02 \)
\( r_w = 0.06 \)
\( L_e = 0.30 \)
\( \ln(\frac{R_e}{r_w}) = 1.13 \)
\( y_0 = 0.44 \)
\( y_t = 0.23 \)
\( t = 200.0 \)

RESULTS

\[ K = 2 \times 10^{-6} \ \text{m/sec} \]
\[ K = 2 \times 10^{-4} \ \text{cm/sec} \]

<table>
<thead>
<tr>
<th>Change in Head (metres)</th>
<th>Time (seconds)</th>
</tr>
</thead>
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</tr>
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</table>

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/22/13
Analysis By: DH
Checked By: CHM
Analysis Date: 1/22/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-2-6

INTERVAL (metres below ground surface)

Top of Interval = 0.4
Bottom of Interval = 2.3

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:
\( r_c \) = casing radius (metres);
\( r_w \) = radial distance to undisturbed aquifer (metres);
\( R_e \) = effective radius (metres);
\( y_0 \) = initial drawdown (metres);
\( L_e \) = length of screened interval (metres);
\( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS
\[ \begin{align*}
    r_c &= 0.06 \\
    r_w &= 0.10 \\
    L_e &= 1.81 \\
    \ln(R_e/r_w) &= 1.78 \\
    y_0 &= 0.40 \\
    y_t &= 0.21 \\
    t &= 50.0
\end{align*} \]

RESULTS
\[ \begin{align*}
    K &= 2 \times 10^{-5} \text{ m/sec} \\
    K &= 2 \times 10^{-3} \text{ cm/sec}
\end{align*} \]
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 12-3-3

INTERVAL (metres below ground surface)
Top of Interval = 40.1
Bottom of Interval = 45.4

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \left( \frac{1}{t} \ln \frac{y_0}{y_t} \right) \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( r_c )</td>
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<tr>
<td>( r_w )</td>
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<tr>
<td>( L_e )</td>
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<td>( \ln \left( \frac{R_e}{r_w} \right) )</td>
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<tr>
<td>( y_0 )</td>
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<tr>
<td>( y_t )</td>
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</tr>
<tr>
<td>( t )</td>
<td>300.0</td>
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</table>

RESULTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( K )</td>
<td>3E-06 m/sec</td>
</tr>
<tr>
<td>( K )</td>
<td>3E-04 cm/sec</td>
</tr>
</tbody>
</table>

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis Date: 1/15/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-3-4A

INTERVAL (metres below ground surface)

Top of Interval = 35.1
Bottom of Interval = 38.7

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[ r_c = 0.02 \]
\[ r_w = 0.06 \]
\[ L_e = 3.60 \]
\[ \ln \left( \frac{R_e}{r_w} \right) = 3.39 \]
\[ y_0 = 0.25 \]
\[ y_t = 0.01 \]
\[ t = 300.0 \]

RESULTS

\[ K = 2E-06 \text{ m/sec} \]
\[ K = 2E-04 \text{ cm/sec} \]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis By: DH
Checked By: CHM
Analysis Date: 1/16/2013

![Graph showing change in head over time](image-url)
BOUWER AND RICE SLUG TEST ANALYSIS

RISING HEAD TEST 12-3-5B

INTERVAL (metres below ground surface)

Top of Interval = 4.6
Bottom of Interval = 4.9

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \cdot \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

- \( r_c = 0.02 \)
- \( r_w = 0.10 \)
- \( L_e = 0.30 \)
- \( \ln \left( \frac{R_e}{r_w} \right) = 1.00 \)
- \( y_0 = 0.28 \)
- \( y_t = 0.10 \)
- \( t = 600.0 \)

RESULTS

- \( K = 7E-07 \text{ m/sec} \)
- \( K = 7E-05 \text{ cm/sec} \)

![Graph showing change in head over time](image_url)

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1125-0045
Test Date: 01/14/13
Analysis By: DH
Checked By: CHM
Analysis Date: 1/15/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-3-6

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[ \begin{align*}
  r_c &= 0.03 \\
r_w &= 0.10 \\
L_e &= 1.20 \\
\ln \left( \frac{R_e}{r_w} \right) &= 1.87 \\
y_0 &= 0.10 \\
y_t &= 0.01 \\
t &= 200.0
\end{align*} \]

RESULTS

\[ \begin{align*}
  K &= 5 \times 10^{-6} \text{ m/sec} \\
  K &= 5 \times 10^{-4} \text{ cm/sec}
\end{align*} \]
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-4-3

INTERVAL (metres below ground surface)

Top of Interval = 38.5
Bottom of Interval = 43.6

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \ln \frac{y_0}{y_t} \quad \text{where } K = \text{m/sec}
\]

where:
- \(r_c\) = casing radius (metres);
- \(r_w\) = radial distance to undisturbed aquifer (metres);
- \(R_e\) = effective radius (metres);
- \(L_e\) = length of screened interval (metres);
- \(y_0\) = initial drawdown (metres);
- \(y_t\) = drawdown (metres) at time \(t\) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>(r_c)</td>
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<tr>
<td>(r_w)</td>
<td>0.05</td>
</tr>
<tr>
<td>(L_e)</td>
<td>5.10</td>
</tr>
<tr>
<td>(\ln(\frac{R_e}{r_w}))</td>
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<tr>
<td>(y_0)</td>
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<tr>
<td>(y_t)</td>
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<tr>
<td>(t)</td>
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</tr>
</tbody>
</table>

RESULTS

\[
K = 2E-08 \quad \text{m/sec} \quad \text{or} \quad K = 2E-06 \quad \text{cm/sec}
\]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/18/13
Analysis Date: 5/2/2013
Analysis By: DH
Checked By: BH
WELL TEST ANALYSIS

Data Set: \..\BH12-4-4A RHT-1_BH.aqt
Date: 12/05/13  Time: 16:41:56

PROJECT INFORMATION

Company: Golder Associate Ltd.
Client: CRRRC/Eastern EA ON/Boundary R
Project: 12-1125-0045/1000/0120
Test Well: 12-4-4A
Test Date: 4/18/2013

AQUIFER DATA

Saturated Thickness: 4.36 m  Anisotropy Ratio (Kz/Kr): 1

WELL DATA (12-4-4A)

Initial Displacement: 0.6458 m  Static Water Column Height: 35.28 m
Total Well Penetration Depth: 2.89 m  Screen Length: 1.85 m
Casing Radius: 0.016 m  Well Radius: 0.05 m

SOLUTION

Aquifer Model: Confined  Solution Method: Butler
K = 0.0001774 m/sec  Le = 31.97 m
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 12-4-5B

INTERVAL (metres below ground surface)
Top of Interval = 4.7
Bottom of Interval = 5.0

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \cdot \frac{1}{t} \ln \frac{y_0}{y_f} \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_f \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS
\begin{tabular}{ll}
\( r_c \) & 0.02 \\
\( r_w \) & 0.06 \\
\( L_e \) & 0.23 \\
\( \ln \left( \frac{R_e}{r_w} \right) \) & 1.06 \\
y_0 & 0.42 \\
y_f & 0.06 \\
t & 400.0 \\
\end{tabular}

RESULTS
\begin{tabular}{cc}
K & 3E-06 m/sec \\
K & 3E-04 cm/sec \\
\end{tabular}

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/18/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/2/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 12-4-6

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.6

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \cdot \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:

\( r_c \) = casing radius (metres);
\( r_w \) = radial distance to undisturbed aquifer (metres);
\( R_e \) = effective radius (metres);
\( y_0 \) = initial drawdown (metres);
\( L_e \) = length of screened interval (metres);
\( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( r_c )</td>
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<tr>
<td>( r_w )</td>
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</tr>
<tr>
<td>( L_e )</td>
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</tr>
<tr>
<td>( \ln\left(\frac{R_e}{r_w}\right) )</td>
<td>2.05</td>
</tr>
<tr>
<td>( y_0 )</td>
<td>0.06</td>
</tr>
<tr>
<td>( y_t )</td>
<td>0.01</td>
</tr>
<tr>
<td>( t )</td>
<td>300.0</td>
</tr>
</tbody>
</table>

RESULTS

<table>
<thead>
<tr>
<th>( K )</th>
<th>3E-06 m/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>( K )</td>
<td>3E-04 cm/sec</td>
</tr>
</tbody>
</table>


![Graph showing change in head over time]
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-10-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

**INPUT PARAMETERS**
- \( r_c = 0.03 \)
- \( r_w = 0.06 \)
- \( L_e = 1.13 \)
- \( \ln(R_e/r_w) = 1.92 \)
- \( y_0 = 0.13 \)
- \( y_t = 0.02 \)
- \( t = 800.0 \)

**RESULTS**
- \( K = 2 \times 10^{-06} \text{ m/sec} \)
- \( K = 2 \times 10^{-04} \text{ cm/sec} \)

---

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/22/13
Analysis Date: 5/6/2013
Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-10-3

INTERVAL (metres below ground surface)

Top of Interval = 5.87
Bottom of Interval = 6.15

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \left( \frac{1}{t} \right) \ln \frac{y_0}{y_t} \]

where \( K \) = m/sec

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[ \begin{align*}
  r_c &= 0.02 \\
  r_w &= 0.06 \\
  L_e &= 0.28 \\
  \ln \left( \frac{R_e}{r_w} \right) &= 1.15 \\
  y_0 &= 0.56 \\
  y_t &= 0.30 \\
  t &= 300.0
\end{align*} \]

RESULTS

\[ \begin{align*}
  K &= 1E-06 \text{ m/sec} \\
  K &= 1E-04 \text{ cm/sec}
\end{align*} \]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/18/13
Analysis Date: 7/23/2013
Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-12-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \( K = \text{m/sec} \)

where:

\( r_c = \text{casing radius (metres)} \)
\( r_w = \text{radial distance to undisturbed aquifer (metres)} \)
\( R_e = \text{effective radius (metres)} \)
\( y_0 = \text{initial drawdown (metres)} \)
\( L_e = \text{length of screened interval (metres)} \)
\( y_t = \text{drawdown (metres) at time } t \text{ (seconds)} \)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( r_c )</td>
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<tr>
<td>( r_w )</td>
<td>0.06</td>
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<tr>
<td>( L_e )</td>
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</tr>
<tr>
<td>( \ln \left( \frac{R_e}{r_w} \right) )</td>
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<td>( y_0 )</td>
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<td>( y_t )</td>
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<tr>
<td>( t )</td>
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RESULTS

<table>
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</thead>
<tbody>
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<td>( K = \text{m/sec} )</td>
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</tr>
<tr>
<td>( K = \text{cm/sec} )</td>
<td>4E-04</td>
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</table>

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/24/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/6/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-12-3

INTERVAL (metres below ground surface)

Top of Interval = 4.8
Bottom of Interval = 5.4

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \( K \) = m/sec

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\begin{align*}
  r_c &= 0.02 \\
  r_w &= 0.06 \\
  L_e &= 0.61 \\
  \ln(\frac{R_e}{r_w}) &= 1.71 \\
  y_0 &= 0.45 \\
  y_t &= 0.20 \\
  t &= 200.0
\end{align*}

RESULTS

\begin{align*}
  K &= 1E-06 \text{ m/sec} \\
  K &= 1E-04 \text{ cm/sec}
\end{align*}

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1127-00125/1000/0120
Checked By: BH
Test Date: 04/18/13
Analysis Date: 5/9/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-17-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{t}{y_0} \ln \frac{y_0}{y_t}
\]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[
\begin{align*}
& r_c = 0.02 \\
& r_w = 0.06 \\
& L_e = 1.22 \\
& \ln(R_e/r_w) = 2.16 \\
& y_0 = 0.12 \\
& y_t = 0.01 \\
& t = 400.0
\end{align*}
\]

RESULTS

\[
\begin{align*}
& K = 1 \times 10^{-6} \text{ m/sec} \\
& K = 1 \times 10^{-4} \text{ cm/sec}
\end{align*}
\]
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-17-3

INTERVAL (metres below ground surface)

Top of Interval = 4.4
Bottom of Interval = 5.0

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\begin{array}{l}
\begin{align*}
rc & = 0.02 \\
rw & = 0.06 \\
Le & = 0.58 \\
\ln(R_e/r_w) & = 1.67 \\
y_0 & = 0.53 \\
y_t & = 0.21 \\
t & = 300.0
\end{align*}
\end{array}

RESULTS

\begin{array}{l}
\begin{align*}
K & = 1E-06 \text{ m/sec} \\
K & = 1E-04 \text{ cm/sec}
\end{align*}
\end{array}

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/17/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/2/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-18-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

where:

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where: $K = \text{m/sec}$

- $r_c$ = casing radius (metres);
- $r_w$ = radial distance to undisturbed aquifer (metres);
- $R_e$ = effective radius (metres);
- $L_e$ = length of screened interval (metres);
- $y_0$ = initial drawdown (metres);
- $y_t$ = drawdown (metres) at time $t$ (seconds)

INPUT PARAMETERS

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<tbody>
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<tr>
<td>$r_w$</td>
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<td>$L_e$</td>
<td>1.22</td>
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<tr>
<td>$\ln(R_e/r_w)$</td>
<td>2.16</td>
</tr>
<tr>
<td>$y_0$</td>
<td>0.55</td>
</tr>
<tr>
<td>$y_t$</td>
<td>0.02</td>
</tr>
<tr>
<td>$t$</td>
<td>300.0</td>
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RESULTS

<table>
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<tr>
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<tbody>
<tr>
<td>$K$</td>
<td>1E-05 m/sec</td>
</tr>
<tr>
<td>$K$</td>
<td>1E-03 cm/sec</td>
</tr>
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</table>

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/22/13

Analysis By: DH
Checked By: BH
Analysis Date: 5/6/2013

Change in Head (metres) vs. Time (seconds) chart.
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-18-3

INTERVAL (metres below ground surface)
Top of Interval = 5.7
Bottom of Interval = 6.2

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \(K = \text{m/sec}\)

where:
\(r_c = \) casing radius (metres);
\(r_w = \) radial distance to undisturbed aquifer (metres);
\(R_e = \) effective radius (metres);
\(L_e = \) length of screened interval (metres);
\(y_0 = \) initial drawdown (metres);
\(y_t = \) drawdown (metres) at time \(t\) (seconds)

INPUT PARAMETERS
\(r_c = 0.02\)
\(r_w = 0.06\)
\(L_e = 0.43\)
\(\ln \left( \frac{R_e}{r_w} \right) = 1.43\)
\(y_0 = 0.43\)
\(y_t = 0.06\)
\(t = 1000.0\)

RESULTS
\(K = 8E-07 \text{ m/sec}\)
\(K = 8E-05 \text{ cm/sec}\)
**BOUWER AND RICE SLUG TEST ANALYSIS**

**RISING HEAD TEST 13-21-2**

**INTerval (metres below ground surface)**

- Top of Interval = 0.3
- Bottom of Interval = 1.5

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \frac{y_0}{y_t}
\]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

**INPUT PARAMETERS**

<table>
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<tr>
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<tbody>
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<tr>
<td>( L_e )</td>
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<td>( y_t )</td>
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<tr>
<td>( t )</td>
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**RESULTS**

<table>
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<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( K )</td>
<td>3E-06 m/sec</td>
</tr>
<tr>
<td>( K )</td>
<td>3E-04 cm/sec</td>
</tr>
</tbody>
</table>

**Graph**

-**x-axis:** Time (seconds)
-**y-axis:** Change in Head (metres)

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/22/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/3/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISEING HEAD TEST 13-24-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[
K = \frac{r_e^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \( K \) = m/sec

where:

- \( r_c \) = casing radius (metres)
- \( r_w \) = radial distance to undisturbed aquifer (metres)
- \( R_e \) = effective radius (metres)
- \( y_0 \) = initial drawdown (metres)
- \( L_e \) = length of screened interval (metres)
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[
\begin{align*}
    r_c & = 0.02 \\
    r_w & = 0.06 \\
    L_e & = 1.22 \\
    \ln(R_e/r_w) & = 2.14 \\
    y_0 & = 0.63 \\
    y_t & = 0.01 \\
    t & = 400.0
\end{align*}
\]

RESULTS

\[
\begin{align*}
    K & = 2E-06 \text{ m/sec} \\
    K & = 2E-04 \text{ cm/sec}
\end{align*}
\]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/22/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/6/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-5-3

INTERVAL (metres below ground surface)
Top of Interval = 35.3
Bottom of Interval = 40.3

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

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<td>( r_w )</td>
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<tr>
<td>( L_e )</td>
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<td>( \ln(R_e/r_w) )</td>
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<td>( y_0 )</td>
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<tr>
<td>( t )</td>
<td>50.0</td>
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</table>

RESULTS

\[
K = \text{5E-06 m/sec}
\]

\[
K = \text{5E-04 cm/sec}
\]

![Graph showing change in head (metres) versus time (seconds)]

Project Name: CRRRC/EA Eastern ON/Boundary Rd  Analysis By: DH
Project No.: 12-1127-00125/1000/0120  Checked By: BH
Test Date: 07/09/13  Analysis Date: 7/12/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-5-4A

INTERVAL (metres below ground surface)

Top of Interval = 28.7
Bottom of Interval = 31.1

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right) 1}{2L_e} \ln \left( \frac{y_0}{y_t} \right)
\]

where \( K = \text{m/sec} \)

where:

\( r_c \) = casing radius (metres);
\( r_w \) = radial distance to undisturbed aquifer (metres);
\( R_e \) = effective radius (metres);
\( y_0 \) = initial drawdown (metres);
\( L_e \) = length of screened interval (metres);
\( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

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<tbody>
<tr>
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<tr>
<td>( r_w )</td>
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<tr>
<td>( L_e )</td>
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<td>( y_t )</td>
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<tr>
<td>( t )</td>
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RESULTS

<table>
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<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( K )</td>
<td>2E-06 m/sec</td>
</tr>
<tr>
<td>( K )</td>
<td>2E-04 cm/sec</td>
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</tbody>
</table>

![Graph of Change in Head vs Time](image-url)
**BOUWER AND RICE SLUG TEST ANALYSIS**

**FALLING HEAD TEST 13-5-5**

**INTERVAL (metres below ground surface)**

- Top of Interval = 4.3
- Bottom of Interval = 4.9

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \left( \frac{1}{t} \right) \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

Input Parameters:

- \( r_c = 0.03 \) m
- \( r_w = 0.10 \) m
- \( L_e = 0.60 \) m
- \( \ln \left( \frac{R_e}{r_w} \right) = 1.23 \)
- \( y_0 = 0.70 \) m
- \( y_t = 0.06 \) m
- \( t = 1200.0 \) s

Output Parameters:

- \( K = 1E-06 \) m/sec
- \( K = 1E-04 \) cm/sec

---

**Project Name:** CRRRC/EA Eastern ON/Boundary Rd  
**Analysis By:** DH  
**Project No.:** 12-1127-00125/1000/0120  
**Checked By:** BH  
**Test Date:** 04/24/13  
**Analysis Date:** 5/7/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-5-6

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{t}{\ln \frac{y_0}{y_t}} \]

where \( K = \text{m/sec} \)

where:

- \( r_c = \) casing radius (metres);
- \( r_w = \) radial distance to undisturbed aquifer (metres);
- \( R_e = \) effective radius (metres);
- \( y_0 = \) initial drawdown (metres);
- \( L_e = \) length of screened interval (metres);
- \( y_t = \) drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>( r_c )</td>
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</tr>
<tr>
<td>( r_w )</td>
<td>0.10</td>
</tr>
<tr>
<td>( L_e )</td>
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<tr>
<td>( \ln(R_e/r_w) )</td>
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<td>( y_0 )</td>
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<td>( y_t )</td>
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<tr>
<td>( t )</td>
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RESULTS

<table>
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<th>Parameter</th>
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</thead>
<tbody>
<tr>
<td>( K = ) (m/sec)</td>
<td>9E-06</td>
</tr>
<tr>
<td>( K = ) (cm/sec)</td>
<td>9E-04</td>
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</tbody>
</table>

---

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/25/13
Analysis Date: 5/7/2013

Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-6-3

INTERVAL (metres below ground surface)

Top of Interval = 41.4
Bottom of Interval = 44.7

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[
\begin{array}{ll}
  r_c &= 0.03 \\
  r_w &= 0.05 \\
  L_e &= 3.34 \\
  \ln(R_e/r_w) &= 3.15 \\
  y_0 &= 0.88 \\
  y_t &= 0.30 \\
  t &= 2000.0
\end{array}
\]

RESULTS

\[
\begin{array}{ll}
  K &= 2 \times 10^{-7} \text{ m/sec} \\
  K &= 2 \times 10^{-5} \text{ cm/sec}
\end{array}
\]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1127-00125/1000/0120
Checked By: BH
Test Date: 04/22/13
Analysis Date: 5/3/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-6-4A

INTERVAL (metres below ground surface)

Top of Interval = 33.0
Bottom of Interval = 35.6

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \left( \frac{1}{t} \right) \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

\( r_c = \) casing radius (metres);
\( r_w = \) radial distance to undisturbed aquifer (metres);
\( R_e = \) effective radius (metres);
\( y_0 = \) initial drawdown (metres);
\( L_e = \) length of screened interval (metres);
\( y_t = \) drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
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<td>( r_w )</td>
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<tr>
<td>( L_e )</td>
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<td>( \ln \left( \frac{R_e}{r_w} \right) )</td>
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<tr>
<td>( t )</td>
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</tbody>
</table>

RESULTS

\( K = 6 \times 10^{-7} \text{ m/sec} \)
\( K = 6 \times 10^{-5} \text{ cm/sec} \)

![Graph showing change in head over time](image_url)
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-6-5B

INTERVAL (metres below ground surface)

Top of Interval = 5.2
Bottom of Interval = 5.6

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \]

where \( K = \text{m/sec} \)

\( r_c \) = casing radius (metres);
\( r_w \) = radial distance to undisturbed aquifer (metres);
\( R_e \) = effective radius (metres);
\( y_0 \) = initial drawdown (metres);
\( L_e \) = length of screened interval (metres);
\( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
<thead>
<tr>
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<tbody>
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RESULTS

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<tbody>
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<td>( K )</td>
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</tr>
<tr>
<td>( K )</td>
<td>2E-04 cm/sec</td>
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</tbody>
</table>

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Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/17/13
Analysis By: DH
Checked By: BH
Analysis Date: 5/3/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-6-6

INTERVAL (metres below ground surface)

Top of Interval = 0.6
Bottom of Interval = 1.6

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{t}{y_0} \ln \left( \frac{y_0}{y_t} \right)
\]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

**INPUT PARAMETERS**

<table>
<thead>
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<th>Value</th>
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<tr>
<td>( r_w )</td>
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</tr>
<tr>
<td>( L_e )</td>
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<tr>
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**RESULTS**

<table>
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</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>( K )</td>
<td>8E-04 cm/sec</td>
</tr>
</tbody>
</table>

---

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/17/13
Analysis Date: 4/22/2013
Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-7-2

INTERVAL (metres below ground surface)
Top of Interval = 34.6
Bottom of Interval = 39.5

where \( K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS
\( r_c = 0.02 \)
\( r_w = 0.04 \)
\( L_e = 4.87 \)
\( \ln \left( \frac{R_e}{r_w} \right) = 4.21 \)
\( y_0 = 0.11 \)
\( y_t = 0.04 \)
\( t = 500.0 \)

RESULTS
\( K = 2E-07 \) m/sec
\( K = 2E-05 \) cm/sec

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1127-00125/1000/0120
Checked By: BH
Test Date: 07/09/13
Analysis Date: 7/9/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-7-3

INTERVAL (metres below ground surface)

Top of Interval = 28.0
Bottom of Interval = 30.3

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right) \frac{1}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}}{y_t}
\]

where \( K = \text{m/sec} \)

where:

\( r_c = \) casing radius (metres); \( r_w = \) radial distance to undisturbed aquifer (metres)
\( R_e = \) effective radius (metres); \( y_0 = \) initial drawdown (metres)
\( L_e = \) length of screened interval (metres); \( y_t = \) drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

<table>
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<tr>
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<th>Value</th>
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</tr>
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RESULTS

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<tr>
<th>( K )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 8 \times 10^{-9} ) m/sec</td>
</tr>
<tr>
<td>( 8 \times 10^{-7} ) cm/sec</td>
</tr>
</tbody>
</table>

--

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/25/13
Analysis Date: 5/7/2013
Analysis By: DH
Checked By: BH
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-7-4-2

INTERVAL (metres below ground surface)

Top of Interval = 5.8
Bottom of Interval = 5.9

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \ln \frac{Y_0}{Y_t} \]

where \( K = \text{m/sec} \)

where:

- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[ r_c = 0.02 \]
\[ R_e = 0.10 \]
\[ L_e = 0.15 \]
\[ \ln \left( R_e/r_w \right) = 1.36 \]
\[ y_0 = 0.30 \]
\[ y_t = 0.03 \]
\[ t = 4000.0 \]

RESULTS

\[ K = 7 \times 10^{-7} \text{ m/sec} \]

\[ K = 7 \times 10^{-5} \text{ cm/sec} \]

---

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1127-00125/1000/0120
Checked By: BH
Test Date: 04/25/13
Analysis Date: 5/8/2013
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-7-5

INTERVAL (metres below ground surface)

<table>
<thead>
<tr>
<th>Top of Interval</th>
<th>Bottom of Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>1.7</td>
</tr>
</tbody>
</table>

\[
K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}
\]

where \(K = \text{m/sec}\)

where:
- \(r_c\) = casing radius (metres);
- \(r_w\) = radial distance to undisturbed aquifer (metres);
- \(R_e\) = effective radius (metres);
- \(L_e\) = length of screened interval (metres);
- \(y_0\) = initial drawdown (metres);
- \(y_t\) = drawdown (metres) at time \(t\) (seconds)

**INPUT PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(r_c)</td>
<td>0.03</td>
</tr>
<tr>
<td>(r_w)</td>
<td>0.10</td>
</tr>
<tr>
<td>(L_e)</td>
<td>1.18</td>
</tr>
<tr>
<td>(\ln \left( \frac{R_e}{r_w} \right))</td>
<td>1.46</td>
</tr>
<tr>
<td>(y_0)</td>
<td>0.25</td>
</tr>
<tr>
<td>(y_t)</td>
<td>0.01</td>
</tr>
<tr>
<td>(t)</td>
<td>600.0</td>
</tr>
</tbody>
</table>

**RESULTS**

\[
\begin{array}{c|c|c}
\hline
& K = & 2E-06 \text{ m/sec} \\
\hline
\ln \left( \frac{R_e}{r_w} \right) & K = & 2E-04 \text{ cm/sec} \\
\hline
\end{array}
\]

---

Change in Head (metres) vs. Time (seconds)

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Analysis By: DH
Project No.: 12-1127-00125/1000/0120
Checked By: BH
Test Date: 04/25/13
Analysis Date: 5/7/2013
BOUWER AND RICE SLUG TEST ANALYSIS
RISING HEAD TEST 13-8-2

INTERVAL (metres below ground surface)

Top of Interval = 0.3
Bottom of Interval = 1.5

where \( K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \frac{y_0}{y_t} \)  

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres);
- \( R_e \) = effective radius (metres);
- \( L_e \) = length of screened interval (metres);
- \( y_0 \) = initial drawdown (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds).

INPUT PARAMETERS

\( r_c = 0.02 \)
\( r_w = 0.06 \)
\( L_e = 1.22 \)
\( \ln \left( \frac{R_e}{r_w} \right) = 2.31 \)
\( y_0 = 0.09 \)
\( y_t = 0.01 \)
\( t = 600.0 \)

RESULTS

\( K = 1E-06 \) m/sec
\( K = 1E-04 \) cm/sec

![Graph showing change in head over time]
BOUWER AND RICE SLUG TEST ANALYSIS
FALLING HEAD TEST 13-8-3

INTERVAL (metres below ground surface)

Top of Interval = 4.4
Bottom of Interval = 4.7

\[ K = \frac{r_c^2 \ln \left( \frac{R_e}{r_w} \right)}{2L_e} \frac{1}{t} \frac{\ln y_0}{y_t} \]

where \( K = \text{m/sec} \)

where:
- \( r_c \) = casing radius (metres);
- \( r_w \) = radial distance to undisturbed aquifer (metres)
- \( R_e \) = effective radius (metres);
- \( y_0 \) = initial drawdown (metres)
- \( L_e \) = length of screened interval (metres);
- \( y_t \) = drawdown (metres) at time \( t \) (seconds)

INPUT PARAMETERS

\[ \begin{align*}
  r_c &= 0.02 \\
  r_w &= 0.06 \\
  L_e &= 0.30 \\
  \ln \left( \frac{R_e}{r_w} \right) &= 1.19 \\
  y_0 &= 0.40 \\
  y_t &= 0.32 \\
  t &= 4000.0
\end{align*} \]

RESULTS

\[ \begin{align*}
  K &= 3 \times 10^{-08} \text{ m/sec} \\
  K &= 3 \times 10^{-06} \text{ cm/sec}
\end{align*} \]

Project Name: CRRRC/EA Eastern ON/Boundary Rd
Project No.: 12-1127-00125/1000/0120
Test Date: 04/24/13
Analysis By: DH
Analysis Date: 5/7/2013

Check Analysis:

Change in Head (metres)

Time (seconds)